
UNIVERSITI SAINS MALAYSIA

First Semester Examination
2010/2011 Academic Session

November 2010

IWK 100 – BIO-RESOURCE AS INDUSTRIAL RAW MATERIALS
[BIO-SUMBER SEBAGAI BAHAN MENTAH INDUSTRI]

Duration: 2 hours
Masa: [2 jam]

Please check that this examination paper consists of THREE pages of printed material before you begin the examination.

[Sila pastikan bahawa kertas peperiksaan ini mengandungi TIGA muka surat yang bercetak sebelum anda memulakan peperiksaan ini.]

Instructions: Answer FOUR questions. You may answer the questions either in Bahasa Malaysia or in English.

[Arahan: Jawab EMPAT soalan. Anda dibenarkan menjawab soalan sama ada dalam Bahasa Malaysia atau Bahasa Inggeris.]

In the event of any discrepancies, the English version shall be used.

[Sekiranya terdapat sebarang percanggahan pada soalan peperiksaan, versi Bahasa Inggeris hendaklah diguna pakai.]

1. (a) What is lignocellulosics as raw materials for industry in Malaysia? Draw and differentiate the basic chemical structures for *kenaf* fiber.

(15 marks)

- (b) Industry based on bio-resources or lignocellulosics such as medium density fiberboard, particleboard, furniture and others are one of the important manufacturing industries in Malaysia which are the third contributor towards the economy of the country. According to the above details, explain 5 important roles in selecting woods or lignocellulosics as a raw material in this industry.

(10 marks)

2. Explain how the utilization of lignocellulosics as a major raw material in the following industries.

- (a) Empty fruit bunch fibre for pulp and paper industry.
- (b) Oil Palm trunk fibre filled thermoplastics composites.
- (c) Kenaf fibre reinforced thermoset composites.

(25 marks)

3. The National Forest Policy is very important in regulating our existing bioresources from the forest. Please outline the important parameters that were contained in the Forest Law Enforcement Act in Malaysia towards regulating our bioresources.

(25 marks)

4. The lignocellulosic or biomass could be used to convert into bioenergy. With an illustration of a flow chart or flowcharts, please explain how bioethanol could be obtained from lignocellulosic materials. What is the difference in the production of bioethanol among sugar crops, starch crops and cellulosic materials?

(25 marks)

1. (a) *Apa itu lignoselulosa sebagai bahan mentah industri di Malaysia? Lukiskan dan bezakan struktur asas kimia gentian kenaf bagi unit-unit tersebut.*

(15 markah)

- (b) *Industries berasaskan biokomposit seperti bod gentian berketumpatan sederhana, papan serpai, wood plastic composit dan lain-lain adalah satu industri pembuatan yang penting di Malaysia masakini dan penyumbang ke-3 ekonomi negara. Berdasarkan kenyataan berikut, jelaskan 5 faktor penting untuk menentukan pemilihan kayu ataupun lignoselulosik sebagai bahan mentah dalam industri tersebut.*

(10 markah)

2. *Huraikan penggunaan utama lignoselulosa sebagai bahan mentah industri berikut:*

- (a) *Industri pulpa dan kertas dari gentian tandan buah kosong.*
(b) *Industri termoplastik komposit terisi gentian batang kelapa sawit.*
(c) *Industri termoset komposit diperkuat gentian kenaf.*

(25 markah)

3. *Polisi Perhutanan Negara sangat penting dalam memantau bio-sumber daripada hutan. Sila nyatakan parameter penting yang terkandung dalam Akta Penguatkuasaan Undang-undang Perhutanan dan pemantauan sumber bio-sumber.*

(25 markah)

4. *Lignoselulosa atau pun biomas dapat digunakan untuk ditukarkan kepada bio energi. Dengan menggunakan satu rajah atau lebih, sila terangkan bagaimana bioetanol boleh diperolehi daripada bahan lignoselulosa. Apakah perbezaan dalam pengeluaran penghasilan bioetanol di antara tanaman gula, tanaman berkanji dan bahan lignoselulosa?*

(25 markah)